學號：　　姓名：

# 國立中山大學 99 學年度第 2 學期資訊工程學系資工數學

## 期中考

**2011/05/18**

(1). Compute the Laplace transform of

(a)f(t)=sin(at)cosh(bt)　　(b)f(t)=cosh(at)cos(at)

(c)f(t)= $e^{-t}\sin(t)$

(2). Find the function $f(t)$ for a given Laplace transform

(a)*F(s)*= $\frac{s^2-a^2}{(s^2+a^2)^2}$　　(b) $F(s)=\frac{s^4+3(s+1)^3}{s^4(s+1)^3}$

(c)*F(s)*= $\frac{3s+5}{s^2+4s+8}$　　(d)F(s)= $\frac{s}{(s^2+a^2)(s^2-b^2)}$

(e)F(s)= $\frac{1}{s^2(s^2+w^2)}$

(3). $y=f(x)$ ，solve $y''-2y'+10y=0, y(0)=2, y(\pi/6)=1$

(4) If the Fourier transform of $f(t)=\frac{1}{a^2+t^2}, a>0$ is $F(w)=(\frac{\pi}{a})e^{-a|w|}$

Then what is the Fourier transform of the function $g(t)=\frac{t}{(a^2+t^2)^2}$ ?

(5) Evaluate the Fourier Transform of the following function:

(a) $f(x)=\exp(-\pi a^2x^2)$　　(b) $f(x)=x\exp(-ax^2)$

(c) $f(x)=\exp(-x^2)$　　(d) $f(x)=\exp(-ax^2)$

(6) Using unit step function of *f*(*t*)= { 2*t*　if 0<*t*<2　，　0　if 2<*t*< $\pi$　，　-cos*t*　if *t*< $\pi$ }

(7) (a) $\Gamma(5)$　　(b) $\Gamma(3.5)$